

**REMARKS**

Claims 1-3 are presently pending in the captioned application with claim 3 being currently amended.

Claim 3 is amended to overcome the outstanding rejection under § 112, ¶ 2. Claim 3 has been amended to positively recite the method steps and to provide antecedent support for a "thermally sensitive recording medium" in line 1 of the claim.

With respect to the art rejection, Applicants respectfully submit that the *prima facie* case of obviousness has not been established. The primary reference (Morita) teaches a different composition because the reference requires a "composite particle emulsion" whereas the presently claimed invention relates to a mixture of an acrylic emulsion and a colloidal silica. The difference is critical to the water resistant properties of the claimed invention. Hence, the primary reference fails to teach the claimed limitation of an acrylic emulsion and a colloidal silica.

Also, one of ordinary skill in the art would not have had any motivation to combine Morita with the secondary reference (Tajiri et al.) because the proposed substitution of incorporating the color preserving agent of formula (1) of Tajiri et al. into the composition of Morita would render the composition of Morita

unsatisfactory for its intended purpose. Assuming that a *prima facie* case has been established, Applicants rebut the presumption with evidence of unexpected results of humidity and water resistance.

Applicants also submit an Information Disclosure Statement directed to references cited in the International Search Report but that were not cited by the Office Action. The Commissioner is authorized to debit the deposit Account No. 19-1980 in the amount of \$ 180.00 to cover the necessary fee.

Accordingly, Applicants respectfully request the Examiner to consider the following remarks, withdraw the rejection in view of the remarks and allow all presently pending claims.

1. Rejection of Claim 3 under 35 U.S.C. § 112, ¶ 2

The Office Action rejects claim 3 under 35 U.S.C. § 112, ¶ 2 as being indefinite. The Office Action states:

- a. was this claim intended to depend from claim 1? Otherwise, there is no antecedent basis for the recitation "the thermally sensitive recording medium" (emphasis added) in line 1 of claim 1 [sic]; and
- b. the meaning of the "comprising the coating" limitation in the last two lines is not clear.

Applicants respectfully traverse the rejection because the claim is definite. However, Applicants have amended claim 3 to provide antecedent support for the thermally sensitive recording medium in line 1 of claim 3. Moreover, Applicants have amended claim 3 to recite positive method steps wherein the amended claim recites "comprising coating said thermally sensitive recording layer on said substrate by means of an air knife coater".

Accordingly, Applicants respectfully submit that claim 3 as amended particularly points out and distinctly claims the subject matter of the invention and request reconsideration and withdrawal of the outstanding § 112, ¶ 2 rejection.

**2. Rejection of Claims 1-3 under 35 U.S.C. § 103(a)**

The Office Action rejects claims 1-3 under 35 U.S.C. § 103(a) as being unpatentable over JP 7266711 ("Morita") in view of U.S. Patent No. 6,680,281 ("Tajiri et al."). The Office Action states:

Applicants acknowledge in their specification that the patent Morita (JP 07-266711) teaches a thermally sensitive recording medium which employs acrylic emulsion and colloidal silica in the thermally sensitive recording layer. Since the color of this recording deteriorates (see the last line of specification), one of ordinary skill in this art would look to teachings such as Tajiri et al which describe color preservability agents for use in

thermally sensitive recording media (see column 6, lines 55 and 56). One such preferred agent is the compound of formula (1) which includes the diphenylsulfone bridgeable compound of applicants' claims. Consequently, use of the Tajiri et al. preservability agent for its concomitant function in the recording medium of Morita would have been obvious to one of ordinary skill in this art in the absence of unexpected results.

Applicants respectfully traverse the rejection because a *prima facie* case of obviousness has not been established. One of ordinary skill in the art would not have had any motivation to combine the teachings of Morita with Tajiri et al. because the proposed substitution of incorporating the color preserving agent of formula (1) of Tajiri et al. with Morita would render the prior art composition of Morita unsatisfactory for its intended purpose. The proposed combination would change the principle operation of the "preservability-improving" agent of formula (1) of Tajiri et al. from its use as a "preservability-improving" agent to a "color-developing" agent.

Morita also teaches away from the claimed invention because Morita requires a "composite particle emulsion" in the thermal recording material whereas the presently claimed invention relates to a mixture of an acrylic emulsion and a colloidal silica. This difference is critical to the water resistant properties of the

claimed invention and is an unobvious and unexpected finding.

Even assuming *arguendo* that a *prima facie* case has been established, Applicants rebut the presumption with evidence of unexpected results of improved humidity and water resistance.

Rule of Law

The Federal Circuit held that a *prima facie* case of obviousness must establish: (1) some suggestion or motivation to modify the references; (2) a reasonable expectation of success; and (3) that the prior art references teach or suggest all claim limitations. Amgen, Inc. v. Chugai Pharm. Co., 18 U.S.P.Q.2d 1016, 1023 (Fed. Cir. 1991); In re Fine, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); In re Wilson, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970).

A *prima facie* case of obviousness must also include a showing of the reasons why it would be obvious to modify the references to produce the present invention. See Ex parte Clapp, 277 U.S.P.Q. 972, 973 (Bd. Pat. App. & Inter. 1985). The Examiner bears the initial burden to provide some convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings. Id. at 974.

In determining the propriety of the Patent Office case for

obviousness with respect to the allegation of a motivation to combine, caselaw provide that it is necessary to ascertain whether or not the reference teachings would appear to be sufficient for one of ordinary skill in the relevant art having the reference before him to make the proposed substitution, combination, or other modification. In re Linter, 173 U.S.P.Q. 560, 562 (CCPA 1972).

The Federal Circuit further held that the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. In re Mills, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990).

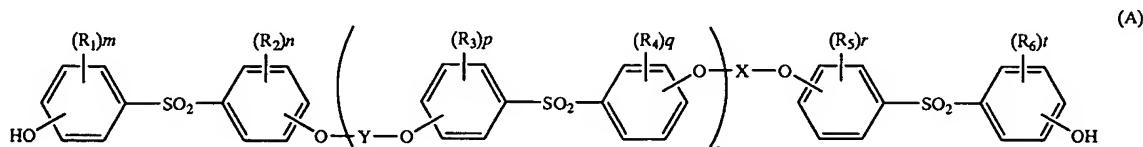
A statement that modifications of the prior art to meet the claimed invention would have been well within the ordinary skill of the art at the time the claimed invention was made because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references. Ex parte Levingood, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. & Inter. 1993)

Moreover, the proposed modification cannot render the prior art unsatisfactory for its intended purpose. If the proposed modification would render the prior art invention being modified

unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. In re Gordon, 221 U.S.P.Q. 1125 (Fed. Cir. 1984). Similarly, if the proposed modification or combination of the prior art would change the "principle of operation" of the prior art invention being modified, then the teachings of the references are again not sufficient to render the claims *prima facie* obvious. In re Ratti, 123 U.S.P.Q. 349 (C.C.P.A. 1959).

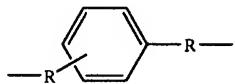
Pending claim 1

Independent claim 1 recites a thermally sensitive recording medium comprising a thermally sensitive color developing layer containing colorless or pale colored basic leuco dye and a color developing agent as a main components on a substrate, wherein said thermally sensitive recording layer contains acrylic emulsion and colloidal silica, further contains at least one kind of diphenylsulfone bridgeable compound represented by general formula A as the color developing agent,

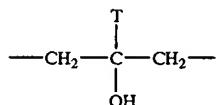


wherein X and Y can be different or same and indicates a

saturated or an unsaturated liner or grafted hydrocarbon group of carbon number 1-12 which can possess an ether bond, or indicate,



or



wherein, R indicates a methylene group or an ethylene group, T indicates a hydrogen atom or an alkyl group of carbon number 1-4, and

R<sub>1</sub>-R<sub>6</sub> independently a halogen atom, an alkyl group of carbon number 1-6, or an alkenyl group, further, m, n, p, q, r, t indicate an integer number of 0-4 and when are bigger than 2, R<sub>1</sub>-R<sub>6</sub> can be different, and a is an integer of 0-10.

### Analysis

Applicants respectfully traverse the rejection because one of ordinary skill in the art would not have had any motivation to combine the teachings of Morita with Tajiri et al. and because the primary reference Morita fails to teach the claimed mixture of an acrylic emulsion and a colloidal silica.

(1) Morita and Tajiri et al. fail to provide any motivation to combine.

One of ordinary skill in the art would not have had any motivation to combine the teachings of Morita with Tajiri et al. because the proposed substitution of incorporating the "color preserving agent" of formula (1) of Tajiri et al. with Morita would render the prior art composition of Morita unsatisfactory for its intended purpose.

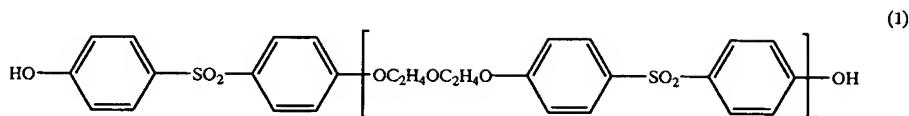
The proposed combination would change the principle operation of the "preservability-improving" agent of formula (1) of Tajiri et al. from its use as a "preservability-improving" agent to a "color-developing" agent.

In particular, Tajiri et al. teaches N-p-toluenesulfonyl-N'-3-(p-toluenesulfonyloxy) phenylurea used as a "color developer" in a heat-sensitive coloring layer. The separate "preservability-improving" agent is a mixture of:

(a) at least one member selected from the group consisting of 1,1,3-tris(2-methyl-4-hydroxy-5-cyclohexylphenyl)butane, 1,3,5-tris(4-tert-butyl-3-hydroxy-2,6-dimethylbenzyl)-isocyanuric acid and 4-benzyloxyphenyl-4'-(2-methyl-2,3-epoxypropoxyloxy)phenyl sulfone, and

(b) at least one compound represented by the

following formula (1)



Although the compound of formula (1) of Tajiri et al. is similar to the color developing agent of the general formula A of the presently claimed invention, the compound of formula (1) of Tajiri et al. is specifically combined with at least one member selected from the group consisting of 1,1,3-tris(2-methyl-4-hydroxy-5-cyclohexylphenyl)butane, 1,3,5-tris(4-tert-butyl-3-hydroxy-2,6-dimethylbenzyl)-isocyanuric acid and 4-benzyloxyphenyl-4'-(2-methyl-2,3-epoxypropoxy)phenyl sulfone.

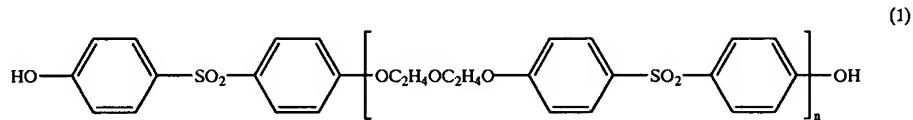
In other words, the compound of the formula (1) of Tajiri et al. results in a completely different composition from that of the claimed invention wherein the result of the teachings of Tajiri et al. is a "preservability-improving" agent while the general formula A of the presently claimed invention results in a "color developing agent". This difference in purpose and function is precisely the sort of teaching that fails to provide any suggestion or motivation to combine the references.

The proposed modification would also render the prior art invention of Morita unsatisfactory for its intended purpose because a color developer is already present. In particular, Morita

teaches a thermal recording layer containing a colorless or light-colored basic dye and a "coupler" wherein the "coupler", which is equivalent to a "color developing agent" of the claimed invention, is 4,4'-bis(p-toluenesulfonylaminocarbonylamino) diphenylmethane.

However, the proposed modification of adding the compound of the formula (1) of Tajiri et al. to the composition of Morita as suggested by the Office Action would result in two different "color developing agents" being present in the thermal recording material.

In particular, the 4,4'-bis(p-toluenesulfonylaminocarbonylamino) diphenylmethane of Morita and the compound represented by the following formula (1) of Tajiri et al.



would both be present if modified as suggested by the Office Action and would thereby render the composition unsuitable for its intended purpose. As stated by the Federal Circuit, the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.

Clearly, one of ordinary skill would not have had any motivation to combine the teachings of Morita with Tajiri et al.

The proposed substitution of incorporating the color preserving agent of formula (1) of Tajiri et al. would render the primary prior art reference, Morita, unsatisfactory for its intended purpose.

(2) Morita and Tajiri et al. teach away from the claimed composition.

Morita teaches away from the claimed invention because Morita requires a "composite particle emulsion" in the thermal recording material whereas the presently claimed invention relates to a mixture of an acrylic emulsion and a colloidal silica. This difference is critical to the water resistant properties of the claimed invention and is an unobvious and unexpected finding.

As stated supra, Morita teaches the "color developer" being 4,4'-bis(p-toluenesulfonylaminocarbonylamino) diphenylmethane. In addition, Morita also teaches that the thermally recording layer contains a "composite particle emulsion" of:

- (1) a **self-crosslinkable** acrylic emulsion and
- (2) colloidal silica (A) and/or
- (3) colloidal silica and an acrylic polymer or styrene-acrylic polymer (B) added to the thermally sensitive layer.

The **self-crosslinkable** acrylic emulsion of Morita changes the

properties of the prior art composition because the resulting "composite particle emulsion" is prepared by **immobilizing** the colloidal silica into the acrylic resin. But as pointed out in the specification of the present invention, when a "composite particle emulsion" such as the one taught by Morita is used, the ground color of a blank part is inferior when preserved in a humid atmosphere. See specification at page 3, lines 18-23.

Although it is not clear why a "composite particle emulsion" such as those taught by Morita exhibit poor water resistance properties, it has been speculated that the colloidal silica bonds strongly during polymerization with the acrylic particle on the outer surface of the particle wherein the acrylic particles fuse with themselves and thereby obstruct the formation of a film.

But in complete contrast to the poor water resistance properties of the prior art compositions, the presently claimed invention demonstrate unexpectedly improved resistance to humidity and water. This improvement results from the fact that the acrylic emulsion and colloidal silica of the claimed invention are mixed together rather than being polymerized as in the teachings of Morita. The mixing results in colloidal silica being weakly bonded with acrylic particle. There is no obstruction in the bonding of the acrylic particles themselves and in the film forming function.

This results in improved water resistance. This clear difference in composition and structure is not taught nor rendered obvious by the teachings of the prior art. Hence, one of ordinary skill would not have had any motivation or suggestion to combine the references, and a *prima facie* case of obviousness has not been established.

Even assuming *arguendo* that a *prima facie* case has been established, Applicants rebut the presumption with evidence of unexpected results of improved humidity and water resistance. As shown in Table 1 on page 20 of the present application, the thermal recording material of the present invention has good water resistance, good humidity resistance (resistance for ground color fogging) and good printing aptitude. Moreover, the presently claimed material has the unexpected and remarkable effect of being able to have excellent print traveling ability while possessing excellent water resistance properties.

Accordingly, Applicants respectfully submit that claims 1-3 are unobvious over the cited references and respectfully request reconsideration and withdrawal of the outstanding 35 U.S.C. § 103(a) rejection.

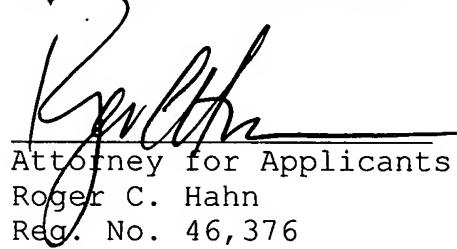
**CONCLUSION**

In light of the foregoing, Applicants submit that the application is now in condition for allowance. The Examiner is therefore respectfully requested to reconsider and withdraw the rejection of the pending claims and allow the pending claims. Favorable action with an early allowance of the claims pending is earnestly solicited.

Respectfully submitted,

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